

WHAT IS CLAIMED IS:

1. In a digital circuit multiplication equipment equipped with a tandem pass-through function capable of passthrough-transmitting a signal with respect to a trunk channel 5 repeated/connected thereto via a exchange, while not performing both a low-bit-rate speech encoding operation and also a low-bit-rate speech decoding operation,

the digital circuit multiplication equipment comprising:

means for transmitting (notifying) the number of trunk channel 10 operated under pass-through operation to another digital circuit multiplication equipment connected via a bearer circuit; and

means for continuously assigning a bearer circuit with respect to the trunk channel operated under pass-through operation.

15 2. A digital circuit multiplication equipment as claimed in claim 1, wherein:

said means for transmitting (notifying) the number of said trunk channel operated under pass-through operation to another digital circuit multiplication equipment connected thereto via the 20 bearer circuit transmits (notifies) the trunk channel number by employing a specific bearer channel number contained in an assignment message of a bearer circuit.

3. A digital circuit multiplication equipment as claimed

in claim 1, wherein:

5        said means for transmitting (notifying) the number of said trunk channel operated under pass-through operation to another digital circuit multiplication equipment connected thereto via the bearer circuit transmits (notifies) the trunk channel number by employing a specific bearer channel number contained in an assignment message of a bearer circuit.

10      4. In a digital circuit multiplication equipment equipped with a tandem pass-through function capable of passthrough-transmitting a signal with respect to a trunk channel repeated/connected thereto via a exchange, while not performing both a low-bit-rate speech encoding operation and also a low-bit-rate speech encoding operation,

15      the digital circuit multiplication equipment comprising:

means for embedding information into a signal which is outputted with respect to a trunk channel operation under pass-through operation, said information indicating as to whether or not a encoded speech signal derived from a bearer circuit is present;

means for detecting from an input signal of a trunk channel operated under pass-through operation, information indicating as to whether or not said encoded speech signal derived from said bearer circuit is present;

means for outputting a first invalid encoded signal indicative of being equal to an invalid encoded signal with respect to the bearer circuit in such a case that the encoded speech signal derived from the bearer circuit is not contained in the input signal of  
5 the trunk channel operated under the pass-through operation;

a speech decoding device for outputting only a signal different from said first invalid encoded signal; and

means for outputting a silent (silent) PCM signal in a trunk channel which receives said first invalid encoded signal from the  
10 bearer circuit.

5. In a digital circuit multiplication equipment equipped with a tandem pass-through function capable of passthrough-transmitting a signal with respect to a trunk channel repeated/connected thereto via a exchange, while not performing both a low-bit-rate speech encoding operation and also a low-bit-rate speech decoding operation,

the digital circuit multiplication equipment comprising:

means for synthesizing a first invalid encoded signal which indicates that in a trunk channel operated under pass-through operation, where an input signal from a bearer circuit is not supplied, a encoded signal thereof is invalid with an output signal of said trunk channel;

a speech decoding device for outputting only a signal different

from a signal for indicating that the encoded signal is invalid with respect to said bearer circuit; and

means for outputting a silent PCM signal in a trunk channel for receiving said first invalid encoded signal from the bearer 5 circuit.

6. A digital circuit multiplication equipment as claimed in claim 4, wherein:

10 said digital circuit multiplication equipment is further comprised of:

means for determining an assignment of the trunk channel operated under pass-through operation to the bearer circuit by employing such information for indicating as to whether or not a 15 encoded speech signal derived from the bearer circuit is present in the input signal of the trunk channel; and

means for delaying a encoded signal contained in an input signal of a trunk channel in such a case that when a state under which the encoded speech signal is not present from the bearer circuit contained in the input signal of the trunk channel operated 20 under pass-through operation is transmitted to another state under which the encoded speech signal is present, the assignment of said trunk channel to the bearer circuit is delayed, and for starting to output said delayed encoded signal after the trunk channel has been assigned to the bearer circuit.

7. A digital circuit multiplication equipment as claimed in claim 4, wherein:

    said digital circuit multiplication equipment is further comprised of:

5      means for outputting encoded speech signals which correspond to plural frames and have been inputted from the bearer circuit in the past with respect to the trunk channel operated under pass-through operation;

10     means for extracting said encoded speech signal corresponding to the plural frames from the input signal of the trunk channel operated under pass-through operation; and

15     means for outputting old encoded speech signals by the delayed assignment number from the encoded speech signals corresponding to the plural frames, which are extracted from the input signal of said trunk channel in such a case that when a state under which the encoded speech signal is not present from the bearer circuit contained in the input signal of the trunk channel operated under pass-through operation is transmitted to another state under which the encoded speech signal is present, the assignment of said trunk 20 channel to the bearer circuit is delayed, and for starting to output said delayed encoded signal after the trunk channel has been assigned to the bearer circuit.

8. A digital circuit multiplication equipment as claimed

in claim 4, wherein:

    said digital circuit multiplication equipment is further comprised of:

    means for embedding information indicative of a encoding rate 5 of a encoded speech signal from the bearer circuit into a signal which is outputted with respect to a trunk channel operated under pass-through operation;

    means for detecting the information indicative of said encoding rate from the input signal of the trunk channel operated 10 under pass-through operation;

    means for determining an assignment of said trunk channel to the bearer circuit by using said encoding rate detected from the input signal of the trunk channel operated under pass-through operation; and

15    means for delaying the encoded signal contained in the input signal of the trunk channel in such a case that when the encoding rate of the encoded speech signal contained in the input signal of the trunk channel operated under pass-through operation is transmitted, the assignment rate change of said trunk channel to 20 the bearer circuit is delayed, and for starting to output the delayed encoded signal after the bearer circuit has been assigned.

9. A digital circuit multiplication equipment as claimed in claim 8, wherein:

100  
said digital circuit multiplication equipment is further  
comprised of:

105  
means for outputting a second invalid encoded signal to the  
bearer circuit until the assignment rate to the bearer circuit is  
changed, said second invalid encoded signal indicating that said  
signal is an invalid encoded speech signal, in such a case that  
when the encoding rate of the encoded speech signal contained in  
the input signal of the trunk channel operated under pass-through  
operation is transmitted, the assignment rate change of said trunk  
channel to the bearer circuit is delayed;

110  
a speech decoding device for outputting only such a signal  
different from both said first invalid encoded signal and said  
second invalid encoded signal; and

115  
means for outputting a silent PCM signal in the case that said  
first invalid encoded signal is entered from the bearer circuit,  
and also for outputting a prediction PCM signal for predicting a  
PCM signal which should be subsequently outputted in such a case  
that said second invalid encoded signal is inputted.

120  
10. A digital circuit multiplication equipment as claimed  
in claim 4, wherein:

125  
said digital circuit multiplication equipment is further  
comprised of:

means for embedding information indicative of a encoding rate

of a encoded speech signal from the bearer circuit into a signal which is outputted with respect to a trunk channel operated under pass-through operation;

means for detecting the information indicative of said 5 encoding rate from the input signal of the trunk channel operated under pass-through operation;

means for determining an assignment of said trunk channel to the bearer circuit by using said encoding rate detected from the input signal of the trunk channel operated under pass-through 10 operation;

means for delaying the encoded signal contained in the input signal of the trunk channel in such a case that when the encoding rate of the encoded speech signal contained in the input signal of the trunk channel operated under pass-through operation is 15 transmitted from a high rate to a low rate, the assignment rate change of said trunk channel to the bearer circuit is delayed, and for starting to output the delayed encoded signal after the bearer circuit has been assigned.

means for outputting a second invalid encoded signal to the 20 bearer circuit until the assignment rate to the bearer circuit is changed, said second invalid encoded signal indicating that said signal is an invalid encoded speech signal, in such a case that when the encoding rate of the encoded speech signal contained in the input signal of the trunk channel operated under pass-through

operation is transmitted from the high rate to the low rate, the assignment rate change of said trunk channel to the bearer circuit is delayed;

means for synthesizing the encoded signal contained in the  
5 input signal of said trunk channel with such information for indicating such a fact that the encoded signal of the low encoding rate is contained in the case that when the encoding rate of the encoded speech signal contained in the input signal of the trunk channel operated under pass-through operation, the assignment rate  
10 change of said trunk channel to the bearer circuit is delayed, and then for outputting the synthesized encoded signal to the bearer circuit;

a speech decoding device for outputting only such a signal different from both said first invalid encoded signal and said  
15 second invalid encoded signal; and

means for outputting a silent PCM signal in the case that said first invalid encoded signal is entered from the bearer circuit, and for outputting a prediction PCM signal for predicting a PCM signal which would be subsequently outputted in such a case that  
20 said second invalid encoded signal is inputted; and further for extracting the encoded signal of the low rate to be decoded into a PCM signal in such a case that such a signal is inputted in which said encoded signal of the low rate is synthesized with the information for indicating that the encoded signal of the low rate

is contained.

11. A digital circuit multiplication equipment as claimed in claim 4, wherein:

5 when a speech encoding system corresponds to the ADPCM system defined in the ITU-T recommendation G.726, a encoded signal which is not defined by said ITU-T recommendation and contains such encodes, all of which for 1 sample are equal to "1", is used as said first invalid encoded signal.

10

12. A digital circuit multiplication equipment as claimed in claim 4, wherein:

pg 47

when a speech encoding system corresponds to the CELP system, a encoded signal containing a vector is used as said first invalid encoded signal, the use frequency of which vector being low when a speech signal is inputted into the encoding device.

13. A digital circuit multiplication equipment as claimed in claim 9, wherein:

20 when a speech encoding system corresponds to the ADPCM system defined in the ITU-T recommendation G.726, a encoded signal which is not defined by said ITU-T recommendation and contains such encodes, all of which for 1 sample are equal to "1", is used as said second invalid encoded signal.

14. A digital circuit multiplication equipment as claimed in claim 9, wherein:

when a speech encoding system corresponds to the CELP system, a encoded signal containing a vector is used as said second invalid encoded signal, the use frequency of which vector being low when a speech signal is inputted into the encoding device.